

AMENDMENTS TO THE CLAIMS

1-27 (cancelled)

28. (new) A computer based method for obtaining a musculo-skeletal model of at least part of a body of a creature from a series of time-dependent optical three-dimensional images of the surface of said at least part of a body of a creature, the method comprising

- detecting anatomical surface information based on a topography of the surface in said series of time dependent optical three-dimensional image of the surface of said at least part of a body of a creature obtained in a contact-free manner, and
- reconstructing internal structures based on said detected anatomical surface information,

wherein said musculo-skeletal model is obtained without the use of synthetic markers attached to the surface of the body.

29. (new) A method according to claim 28, wherein said series of time-dependent optical three-dimensional images of the surface of said at least part of a body of a creature obtained in a contact-free manner is provided using structured light projection.

30. (new) A method according to claim 28, wherein said series of time-dependent optical three-dimensional images of the surface of said at least part of a body of a creature obtained in a contact-free manner is provided using raster line triangulation.

31. (new) A method according to claim 28, wherein said series of time-dependent optical three-dimensional images of the surface of said at least part of a body of a creature obtained in a contact-free manner is provided using stereoscopic techniques.

32. (new) A method according to claim 28, wherein said series of time-dependent optical three-dimensional images of the surface of at least part of said body of a creature obtained in a contact-free manner is provided by obtaining said three-dimensional images

whereby each of a width, height and depth of said three-dimensional images can have a length up to 1,2 m.

33. (new) A method according to claim 28, wherein said time-dependent three-dimensional image of the surface of said at least part of the body of a creature obtained in a contact-free manner is provided using a multi-view system.

34. (new) A method according to claim 28, wherein said detecting anatomical surface information based on a topography of the surface in said series of time-dependent optical three-dimensional images is obtained by active contour modelling.

35. (new) A method according to claim 34, wherein said active contour modelling is based on optimising a finite number of active contour points, whereby all active contour points substantially being at an equal distance.

36. (new) A method according to claim 28, wherein said detecting anatomical surface information based on the topography of the surface in said series of time-dependent optical three-dimensional image is obtained by active shape modelling.

37. (new) A method according to claim 28, wherein said reconstructing internal structures comprises at least one of the group of bones, ligaments, tendons and muscles.

38. (new) A method according to claim 28, wherein said anatomical surface information are landmarks.

39. (new) A method for collecting data suitable for diagnostics of disorders in creatures, comprising building a computer based musculo-skeletal model obtained according to the method of claim 28.

40. (new) A system for obtaining a musculo-skeletal model of at least part of a creature, the system comprising

- means for providing a series of time-dependent optical three-dimensional images of a surface of said at least part of a body of a creature obtained in a contact-free manner,
- means for detecting anatomical surface information on said series of time dependent optical three-dimensional images of a surface of said at least part of a body of a creature obtained in a contact-free manner, and
- means for reconstructing internal structures based on said detected anatomical surface information

wherein the system is adapted to obtain the musculo-skeletal model without the use of synthetic markers attached to the surface of the body.

41. (new) A system according to claim 40, wherein said means for providing a series of time-dependent optical three-dimensional images of a surface of said at least part of a body of a creature obtained in a contact free manner comprises a means for obtaining in a contact free manner optical three-dimensional images of the surface of said at least part of a body of a creature.

42. (new) A system according to claim 40, wherein said anatomical surface information are landmarks.

43. (new) A computer based method for detecting and/or extracting from a series of time-dependent images of a surface of body parts of a creature anatomical features on surface measurements, said method comprising using invariant feature analysis to determine anatomical landmarks and shapes, wherein said invariant feature analysis comprises fulfilling predetermined conditions describing topographic characteristics of the surface of the body parts of the creature and fulfilling predetermined conditions describing topographic, topologic and/or volumetric characteristics of the interior of the body parts of the creature.

44. (new) A computer based method according to claim 43, wherein said topographic characteristics of the surface of the body parts of the creature are at least one of

curvature and symmetry of surface parts of the body parts of the creature and wherein said topographic, topologic and/or volumetric characteristics of the interior of the body parts of a creature are at least one of the relative position, bending, torsion, equidistance and dynamical properties of interior parts of the body parts of the creature.

45. (new) A method according to claim 44, wherein said topographic characteristics of the surface of the body parts of the creature are curvature and symmetry of surface parts of the body parts of the creature and said topographic, topologic and/or volumetric characteristics of the interior of the body parts of a creature are the relative position, bending, torsion, equidistance and dynamical properties of interior parts of the body parts of the creature.

46. (new) A method according to claim 43 wherein said predetermined conditions describing topographic characteristics of the surface of the body parts of the creature and said predetermined conditions describing topographic, topologic and volumetric characteristics of the interior of the body parts of the creature are determined by biomechanical constraints.

47. (new) A computer based method for constructing a time-dependent three-dimensional biomechanical model of a musculo-skeletal structure of at least part of a body of a creature from time-dependent anatomical surface information, said method comprising

- determining from said time-dependent anatomical surface information a set of boundary conditions for a time-dependent three-dimensional biomechanical model of a musculo-skeletal structure, and
- fitting a time-dependent three-dimensional bio-mechanical model of a musculo-skeletal structure according to said set of boundary conditions,

wherein said anatomical surface information comprises both landmarks and surface shapes.

48. (new) A computer based method according to claim 47, wherein said method furthermore comprises initially scaling and calibrating said bio-mechanical model of a

musculo-skeletal structure based on anatomical surface information obtained for said at least part of a body of a creature in a predefined position.

49. (new) A computer based method according to claim 47, wherein said method furthermore comprises, after fitting a biomechanical model of a musculo-skeletal structure, checking the plausibility of said biomechanical model of a musculo-skeletal structure with respect to biomechanical constraints.

50. (new) A computer based method according to claim 47, wherein said method furthermore comprises, after fitting a biomechanical model of a musculo-skeletal structure according to said set of boundary conditions, dynamically adjusting and refining said biomechanical model of a musculo-skeletal structure from repeatedly obtained new time-dependent anatomical surface information, by repeatedly

- determining the new boundary conditions for a biomechanical model of a musculo-skeletal structure based on said new time-dependent anatomical surface shape information, and
- adjusting said biomechanical model of a musculo-skeletal structure according to said set of new boundary conditions.

51. (new) A computer based method of extended modelling of kinematics, kinetics and dynamics of the musculo-skeletal system of a moving body comprising extraction of relevant parameters from the bio-mechanical model according to claim 47.

52. (new) A computer program product for executing the method as claimed in claim 28.

53. (new) A machine readable data storage device storing the computer product of claim 52.

54. (new) Transmission of the computer program product of claim 52 over a local or wide area telecommunications network.

55. (new) A computer program product for executing the method as claimed in claim 43.

56. (new) A machine readable data storage device storing the computer product of claim 55.

57. (new) Transmission of the computer program product of claim 55 over a local or wide area telecommunications network.

58. (new) A computer program product for executing the method as claimed in claim 47.

59. (new) A machine readable data storage device storing the computer product of claim 58.

60. (new) Transmission of the computer program product of claim 58 over a local or wide area telecommunications network.

61. (new) A computer program product for executing the method as claimed in claim 51.

62. (new) A machine readable data storage device storing the computer product of claim 61.

63. (new) Transmission of the computer program product of claim 61 over a local or wide area telecommunications network.